Course material

Course:

Micro and Nanofabrication (MEMS)

Video:

3.10 Sputtering in CMi

Concepts (extracted from automatically generated subtitles):

Sputter target. Robotic arm. Sputter process step. Specific case. Cluster sputtering tool. Load lock chamber of the system. Magnetic field. Sputtering system. Deposition chambers. Magnetic field lines. Aluminum oxide. Further look. Centre of the tool. Silicon dioxide. Load lock.

to video sequence search
(within Micro and Nanofabrication (MEMS).)

to video

The sputtering system that you see here is called a cluster sputtering tool. In this case with four deposition chambers allowing to pass wafers to various sputtering chambers without breaking the vacuum. Per sputter process step, only one wafer is used per chamber in this particular equipment. Wafers are loaded in the load lock chamber of the system from behind the wall on the right side of the image. Then a robotic arm located in the centre of the tool transfers the wafers from the load lock into one of the 4 sputtering chambers. The robotic arm enters into the load lock, moves up to lift the wafer from the chuck, leaves the load lock and distributes the wafer in the desired sputtering chamber. Let's now have a further look at the inside of the tool and see how the clean room engineer changes the sputter target. Remember the target is a plate made of the material that we want to sputter deposit on our substrate. In that specific case, the target which is changed, is used for RF magnetron sputtering. You can see the RF generator the grey metallic box and the magnet, the black cylinders. The other 3 chambers are DC magneton sputtering with only the magnet and no RF generator. The first step when changing the target is to remove the target shield. This shield is used to avoid sputtering of the structural elements of the cathode and to improve gas diffusion. Then the target itself can be removed. The home made tool is used to remove the target in order to allow a single person to perform this manipulation. In this specific case, the target is made of titania. It is changed not because it is worn out, but because we need to sputter another material in this particular chamber. We can also see that a copper grid is used at the

notes

summary

0m 0s

back of the target to ensure a good electrical contact. When a sputter target is worn out it also needs to be changed. This operation is shown here which also shows nicely how a sputter target in magnetron sputtering looks after some use. The wear, clearly is not uniform, because of the magnetic field which concentrates ions along magnetic field lines so that they optimise the sputter yield. In comparison, here are shown new sputter targets where the surface is still uniform. The two examples shown in the video are aluminum oxide and silicon dioxide new targets. To mount a target in the tool the operation steps shown in this video sequence are performed in the exact reverse order.

notes

summary